Process for the preparation of L-amino acids by fermentation and nucleotide sequences coding for the accDA gene

Claims

1. Preferably recombinant DNA originating from Corynebacterium which is capable of replication in coryneform microorganisms and which at least contains the nucleotide sequence coding for the accDA gene shown in SEQ ID No. 1.

2. DNA capable of replication, as claimed in claim 1, with:

   (i) the nucleotide sequence shown in SEQ ID No. 1,

   (ii) at least one sequence corresponding to the sequence (i) within the region of degeneracy of the genetic code, or

   (iii) at least one sequence hybridizing with the sequence complementary to the sequence (i) or (ii), and optionally

   (vi) [sic] neutral sense mutations in (i).

3. Protein amino acid sequence derived from the nucleotide sequences as claimed in claim 1 or 2, shown in SEQ ID No. 3.

4. Coryneform microorganisms, especially of the genus Corynebacterium, transformed by the introduction of one or more of the DNAs capable of replication as claimed in claim 1 or 2.

5. Shuttle vector pZ1accDA with the restriction map shown in Fig. 1, deposited in Corynebacterium glutamicum under number DSM12785.

6. A process for the preparation of L-amino acids, especially L-lysine, by the fermentation of corynebacteria, wherein bacteria are used in which the accDA gene or nucleotide sequences coding therefor are amplified and, in particular, overexpressed.

7. The process as claimed in claim 5 [sic], wherein bacteria are used in which other genes of the biosynthetic pathway of the desired L-amino acid are additionally amplified.

8. The process as claimed in claim 5 [sic], wherein bacteria are used in which the metabolic pathways which reduce the formation of the desired L-amino acid are at least partially switched off.

9. The process as claimed in claims 5 to 7 [sic], wherein a strain transformed [sic] plasmid vector is used and the plasmid vector carries the nucleotide sequence coding for the accDA gene.

10. The process as claimed in claim 8 [sic], wherein bacteria transformed with plasmid vector pZ1accDA, deposited in Corynebacterium glutamicum under number DSM12785, are used.

11. The process as claimed in one or more of the preceding claims, wherein corynebacteria are used which produce L-aspartic acid, L-asparagine, L-homoserine, L-threonine, L-isoleucine and L-methionine.

12. The process as claimed in one or more of claims 5 to 10 [sic], wherein corynebacteria are used which produce L-lysine.

13. The process as claimed in one or more of claims 5 to 11 [sic], wherein the accBC gene is overexpressed in addition to the accDA gene.

14. The process as claimed in claim 5 [sic], wherein the dapA gene coding for dihydrodipicolinate synthase is simultaneously overexpressed.

15. The process as claimed in claim 5 [sic], wherein a DNA fragment conferring S-(2-aminoethyl)cysteine resistance is simultaneously amplified.

16. The process for the preparation of L-amino acids by fermentation as claimed in one or more of the preceding claims, wherein the following steps are carried out:

a) fermentation of the corynebacteria producing the desired L-amino acid, in which at least the accDA gene is amplified,

b) enrichment of the desired L-amino acid in the medium or in the cells of the bacteria, and

c) isolation of the desired L-amino acid.